Electronic TUBES

6X8 — 5X8

TRIODE-PENTODE

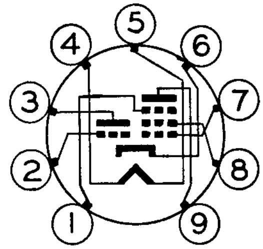
FOR VHF CONVERTER APPLICATIONS

DESCRIPTION AND RATING

The 6X8 is a miniature tube incorporating a medium-mu triode and a sharp-cutoff pentode in one envelope. It is designed primarily for use as a combined triode oscillator and pentode mixer in television and FM receivers. Its performance in this application is comparable to that obtainable with a 6AG5 mixer and an oscillator which consists of a single section of a 6J6.

Except for heater ratings and heater-cathode voltage ratings, the 5X8 is identical to the 6X8. The 5X8, as the result of its 600-milliampere heater rating and its controlled heater warm-up characteristic, is particularly suited for use in television receivers which employ series-connected heaters. When the 5X8 is used in conjunction with other 600-milliampere types which exhibit essentially the same heater warm-up characteristic, heater voltage surges across the individual tubes are minimized during the warm-up period.

BASING DIAGRAM

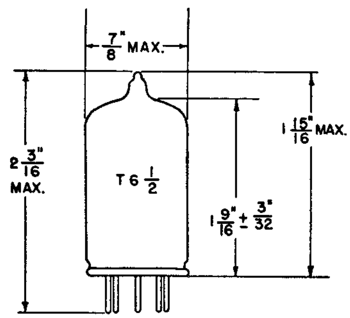


RETMA 9AK

TERMINAL CONNECTIONS

Pin 1—Pentode Grid Number 3 (Suppressor)
Pin 2—Triode Grid
Pin 3—Triode Plate
Pin 4—Heater
Pin 5—Heater
Pin 6—Cathode
Pin 7—Pentode Grid Number 1
Pin 8—Pentode Grid Number 2 (Screen)
Pin 9—Pentode Plate

PHYSICAL DIMENSIONS



RETMA 6-2

GENERAL

ELECTRICAL

Cathode—Coated Unipotential	5X8	6X8
Heater Voltage, AC or DC	4.7	6.3 Volts
Heater Current	0.6	0.45 Amperes
Heater Warm-up Time*	11	.. Seconds

Direct Interelectrode Capacitances	With Shield†	Without Shield
Pentode Section		
Grid-Number 1 to Plate, maximum	0.06	0.09 μμf
Input	4.5	4.3 μμf
Output	1.4	0.7 μμf
Triode Section		
Grid to Plate	1.4	1.4 μμf
Input	2.6	2.0 μμf
Output	1.0	0.5 μμf
Pentode Section, Triode Connection‡		
Grid-Number 1 to Plate	1.3	1.4 μμf
Input	3.2	3.0 μμf
Output	2.0	1.6 μμf
Pentode Grid-Number 1 to Triode Plate, maximum	0.035	0.045 μμf
Pentode Plate to Triode Plate, maximum	0.008	0.040 μμf
Heater to Cathode	5.2	5.2 μμf

MECHANICAL

Mounting Position—Any
Envelope—T-6½, Glass
Base—E9-1, Small Button 9-Pin

MAXIMUM RATINGS

CONVERTER SERVICE—DESIGN-CENTER VALUES

PENTODE SECTION AS MIXER

	Pentode Connection	Triode Connection‡	
Plate Voltage	250	250	Volts
Suppressor Voltage	0	...	Volts
Screen-Supply Voltage	250	...	Volts
Screen Voltage—See Screen Rating Chart			
Positive DC Grid-Number 1 Voltage	0	0	Volts
Negative DC Grid-Number 1 Voltage	40	40	Volts
Plate Dissipation	2.0	2.4	Watts
Screen Dissipation	0.4	...	Watts
Heater-Cathode Voltage			
Heater Positive with Respect to Cathode	100	100	Volts
Heater Negative with Respect to Cathode	100	100	Volts
Grid-Number 1 Circuit Resistance			
With Fixed Bias	0.1	0.1	Megohms
With Cathode Bias	0.5	0.5	Megohms

TRIODE SECTION AS OSCILLATOR

Plate Voltage	250	Volts
Positive DC Grid Voltage	0	Volts
Negative DC Grid Voltage	40	Volts
Plate Dissipation	1.5	Watts
Grid Input	0.5	Watts
Heater-Cathode Voltage		
Heater Positive with Respect to Cathode	100	Volts
Heater Negative with Respect to Cathode	100	Volts
Grid Circuit Resistance		
With Fixed Bias	0.1	Megohms
With Cathode Bias	0.5	Megohms

CHARACTERISTICS AND TYPICAL OPERATION

AVERAGE CHARACTERISTICS—PENTODE SECTION	Pentode Connection	Triode Connection‡
Plate Voltage	250	150 Volts
Suppressor, Connected to Cathode at Socket		
Screen Voltage	150	... Volts
Cathode-Bias Resistor	200	250 Ohms
Amplification Factor	...	42
Plate Resistance, approximate	750000	7900 Ohms
Transconductance	4600	4000 Micromhos
Plate Current	7.7	7.8 Milliamperes
Screen Current	1.6	... Milliamperes
Grid-Number 1 Voltage, approximate $I_b = 10$ Microamperes	−10	−10 Volts

AVERAGE CHARACTERISTICS—TRIODE SECTION

Plate Voltage	100 Volts
Cathode-Bias Resistor	100 Ohms
Amplification Factor	40
Plate Resistance, approximate	6900 Ohms
Transconductance	5800 Micromhos
Plate Current	8.5 Milliamperes
Grid Voltage, approximate $I_b = 10$ Microamperes	−10 Volts

CONVERTER SERVICE

PENTODE SECTION AS MIXER WITH SEPARAT EEXCITATION	Pentode Connection	Triode Connection‡
Plate Voltage	150	150 Volts
Suppressor, Connected to Cathode at Socket		
Screen Voltage	150	... Volts
Grid-Number 1 Supply Voltage	−3.5	−3.5 Volts
Grid-Number 1 Circuit Resistance	120000	120000 Ohms
Oscillator Voltage at Grid-Number 1, RMS	2.6	2.6 Volts
Plate Current	6.2	7.8 Milliamperes
Screen Current	1.8	... Milliamperes
Grid-Number 1 Current	2.0	2.0 Microamperes
Conversion Transconductance	2100	2800 Micromhos

TRIODE SECTION AS 250 MEGACYCLE OSCILLATORπ

Plate Voltage	150 Volts
Grid Resistor	2700 Ohms
Plate Current	13 Milliamperes
Grid Current	3.6 Milliamperes
Power Output, approximate	0.5 Watts

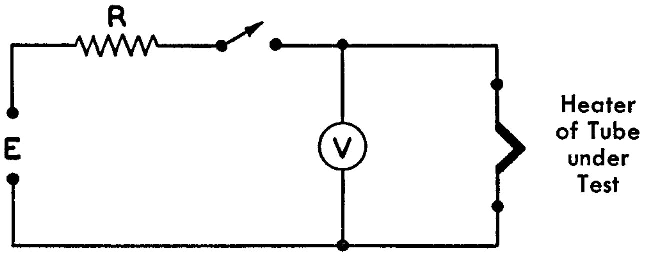
*Heater warm-up time is defined as the time required in the circuit shown at the right for the voltage across the heater terminals (V) to increase from zero to the heater test voltage (V_1). For this type, E=18.7 volts (RMS or DC), V_1=3.73 volts (RMS or DC), and R=23.5 ohms.

†With external shield (RETMA 315) connected to cathode unless otherwise indicated.

‡With screen connected to plate and suppressor connected to cathode.

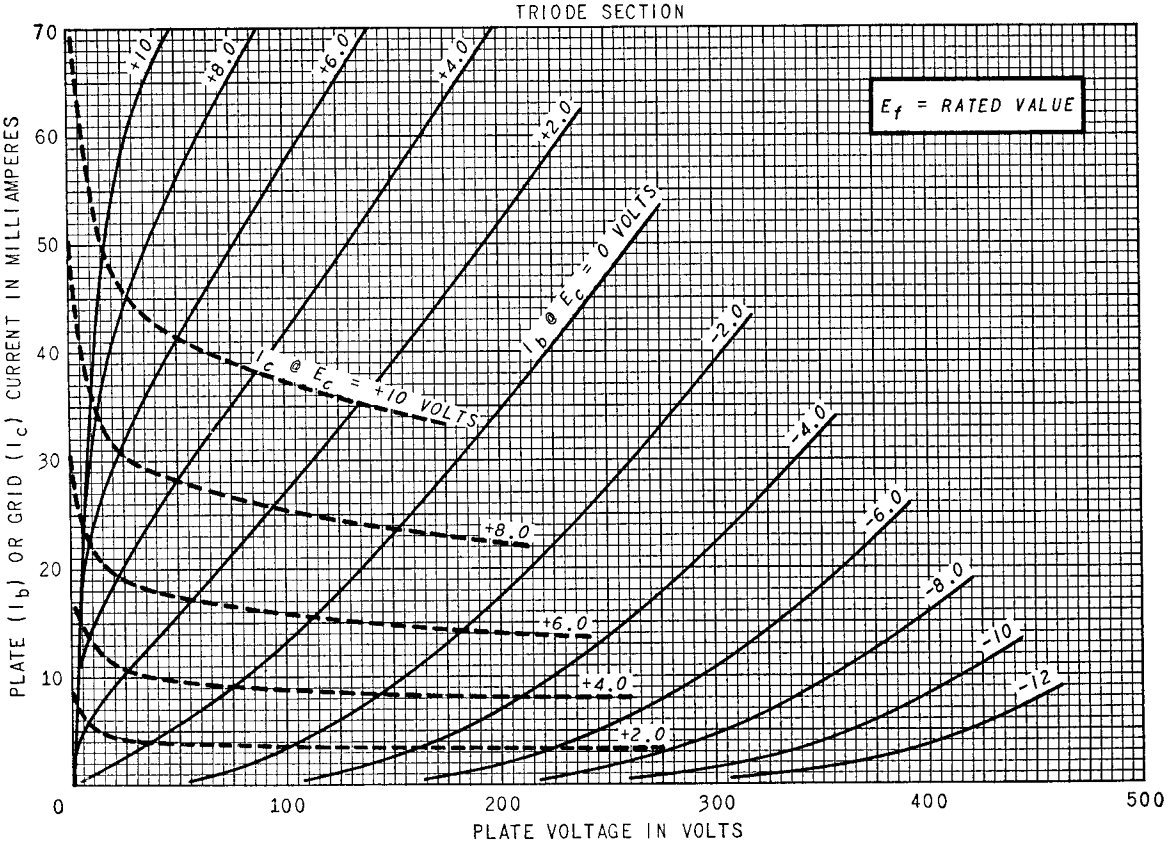
§With external shield (RETMA 315) connected to ground.

πIn TV or FM receivers, the oscillator should generally be operated with less power input than shown in the data in order to avoid over-excitation and excessive oscillator radiation.

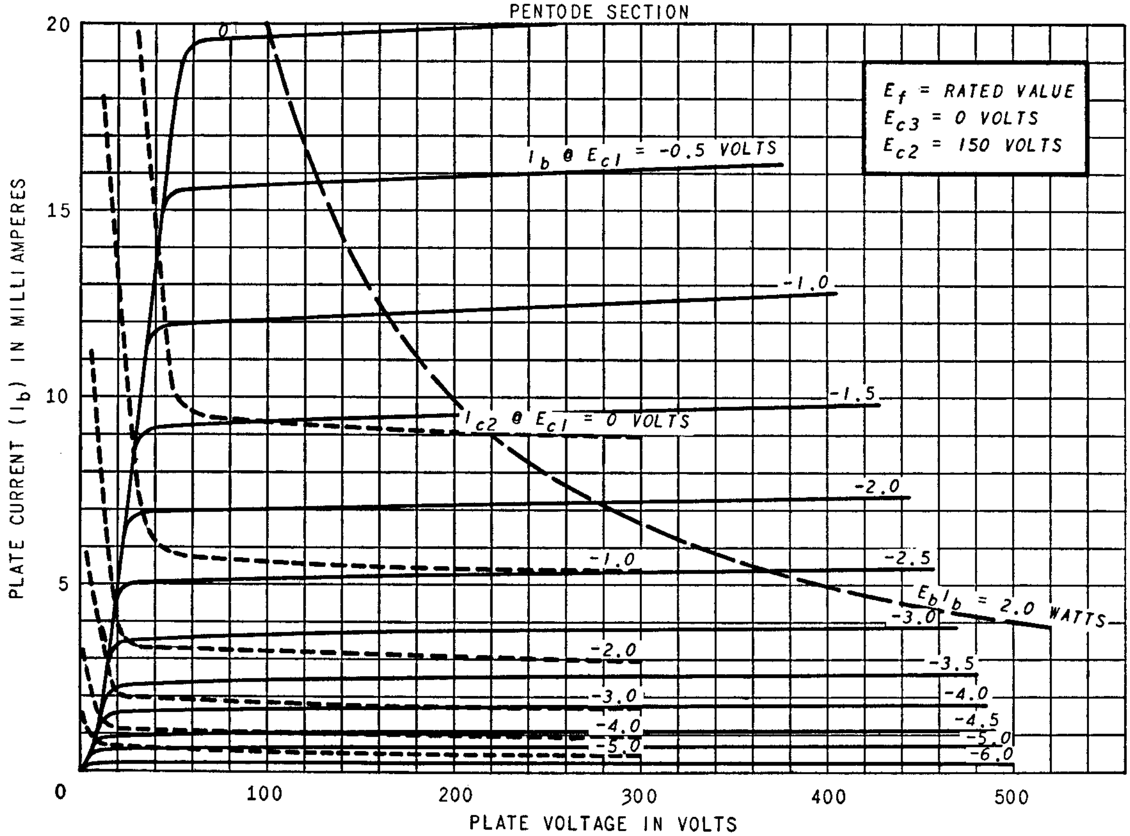


AVERAGE PLATE CHARACTERISTICS

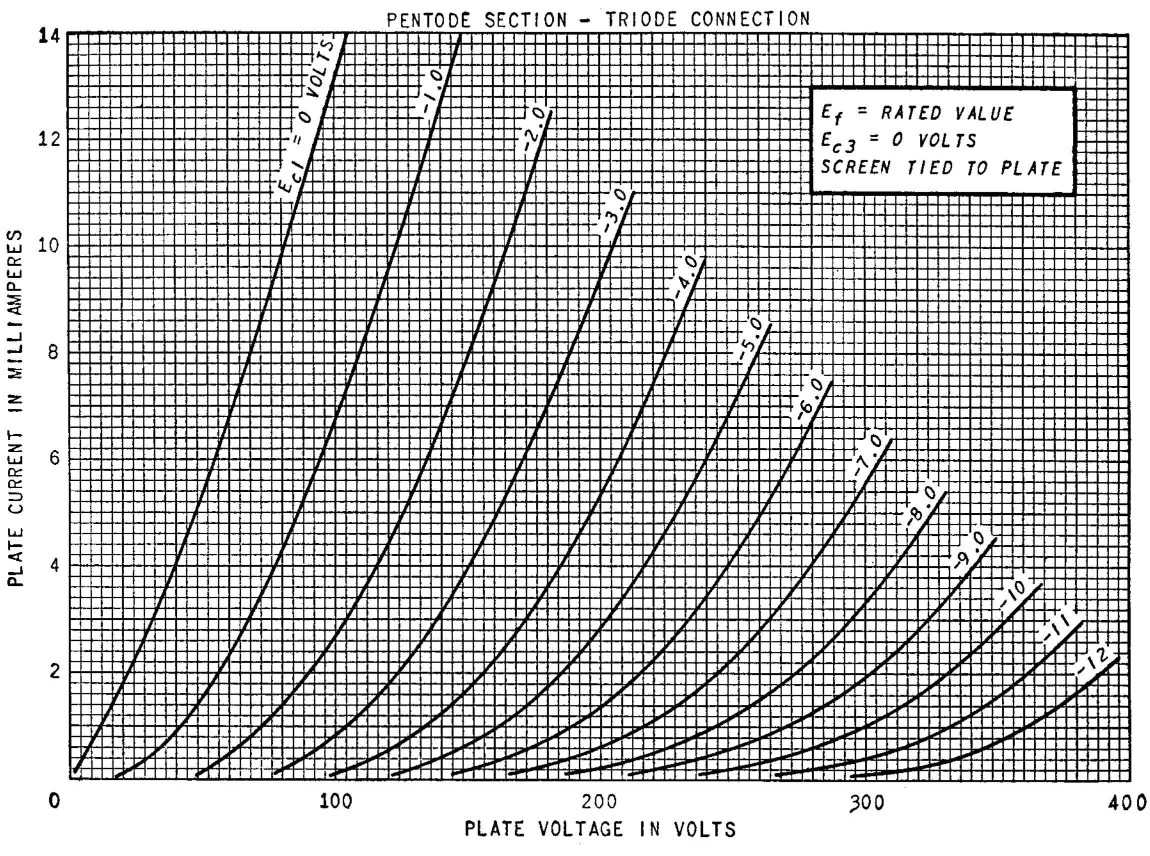
TRIODE SECTION



AVERAGE PLATE CHARACTERISTICS

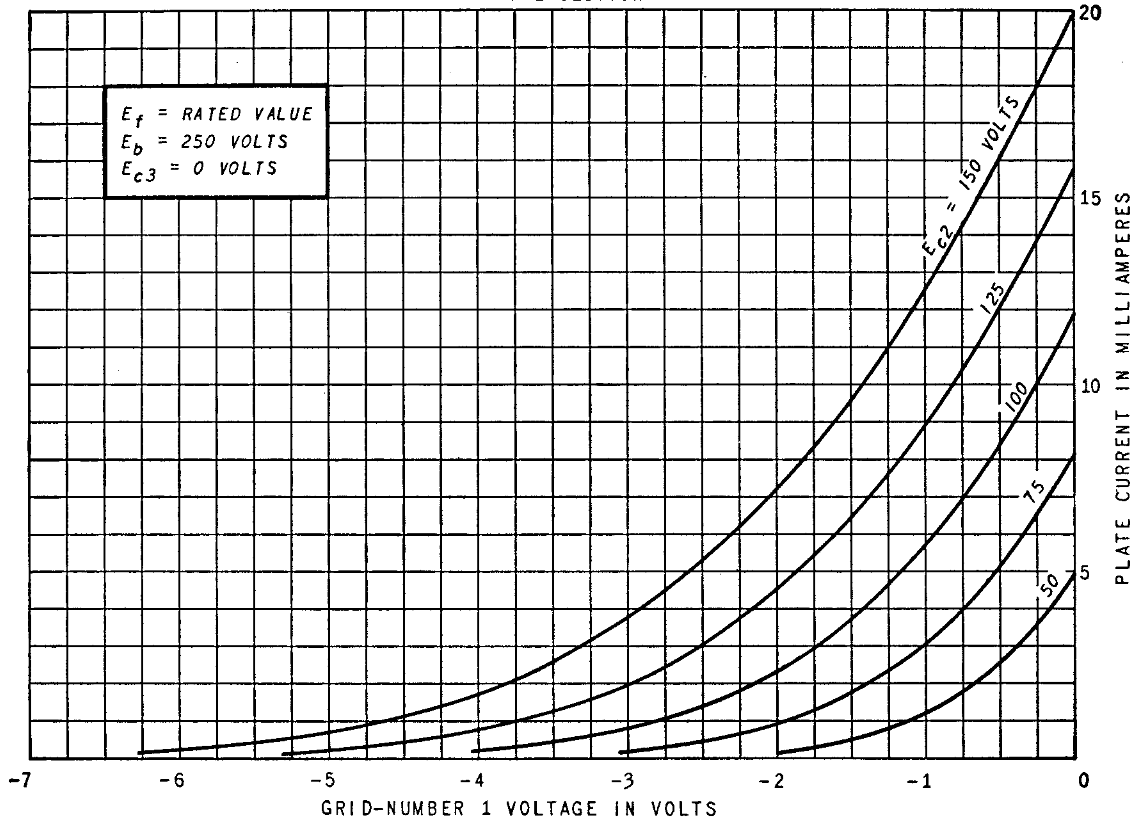


AVERAGE PLATE CHARACTERISTICS



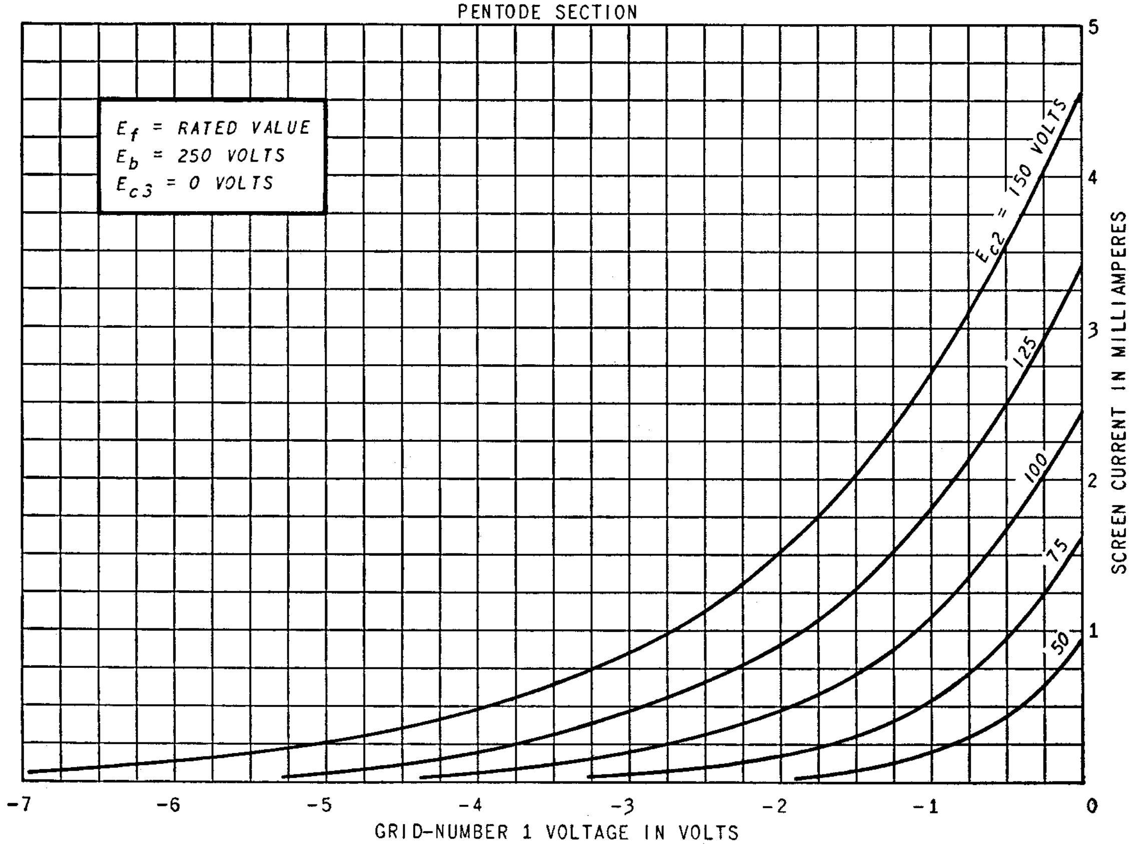
AVERAGE TRANSFER CHARACTERISTICS

PENTODE SECTION



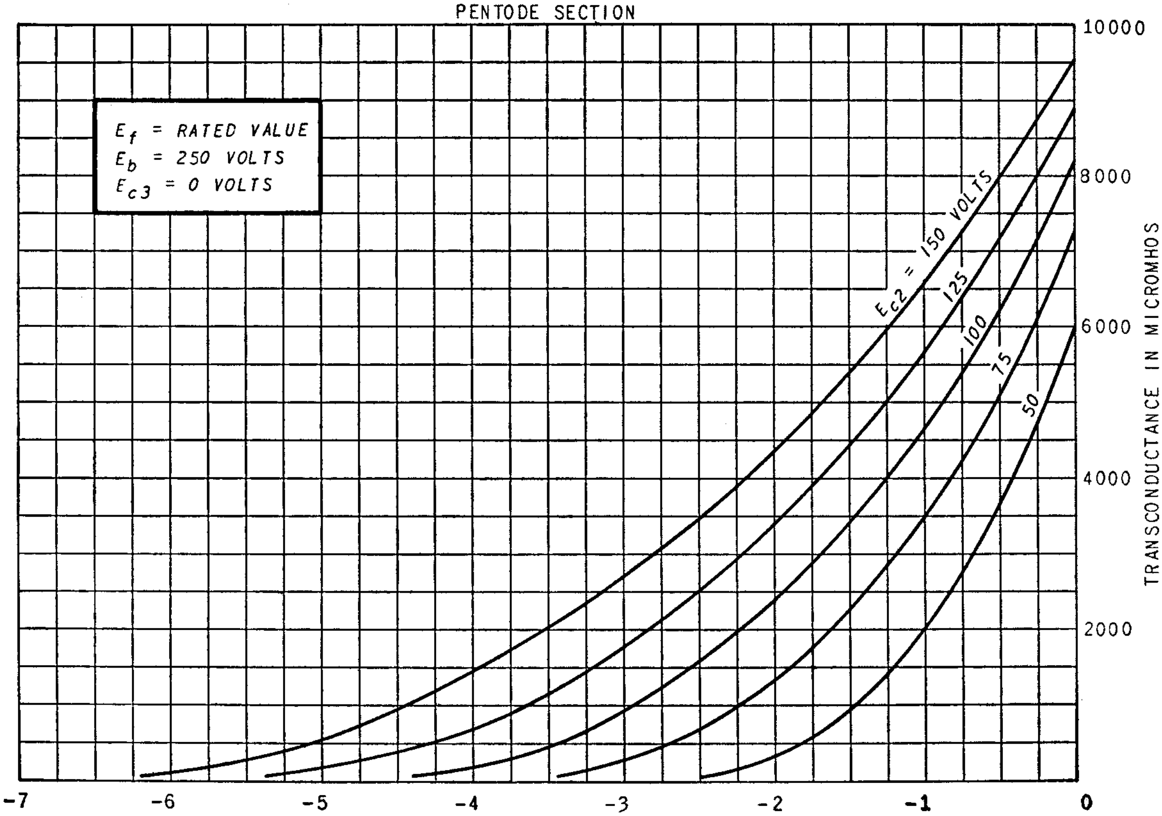
AVERAGE TRANSFER CHARACTERISTICS

PENTODE SECTION



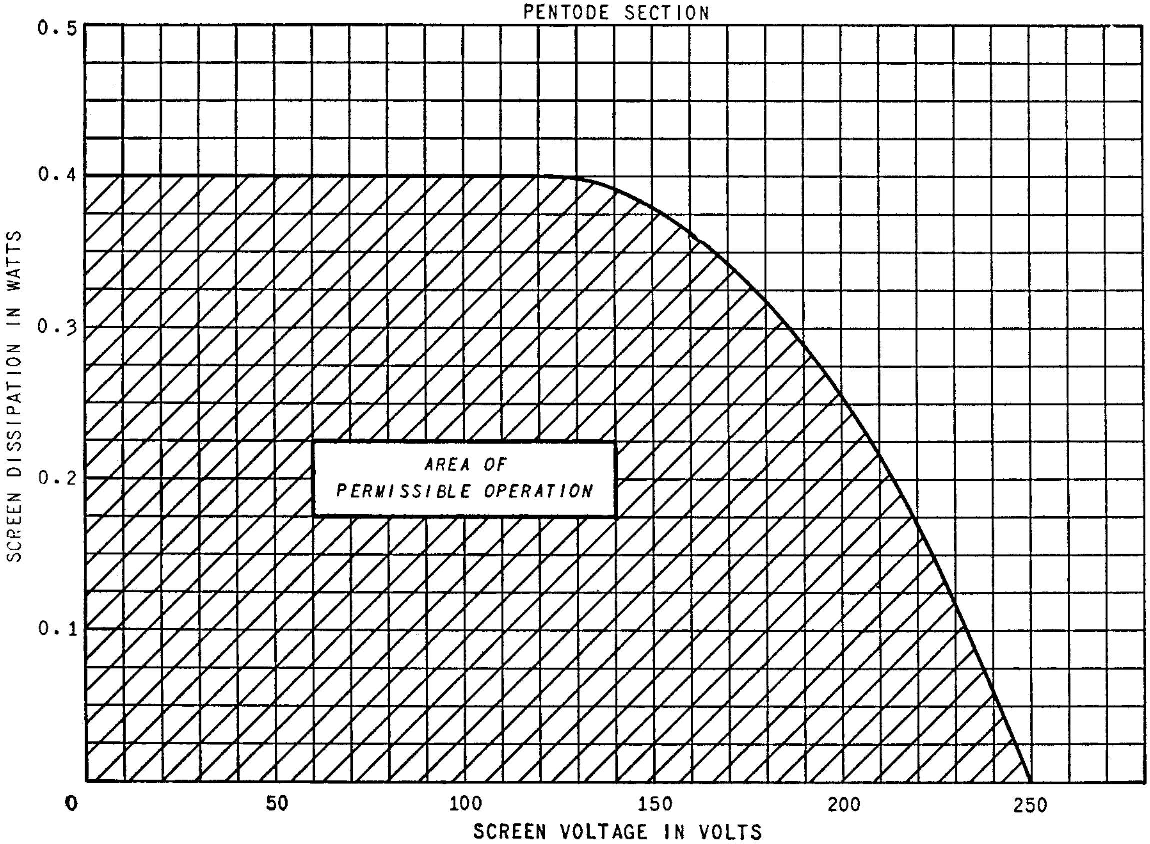
AVERAGE TRANSFER CHARACTERISTICS

PENTODE SECTION



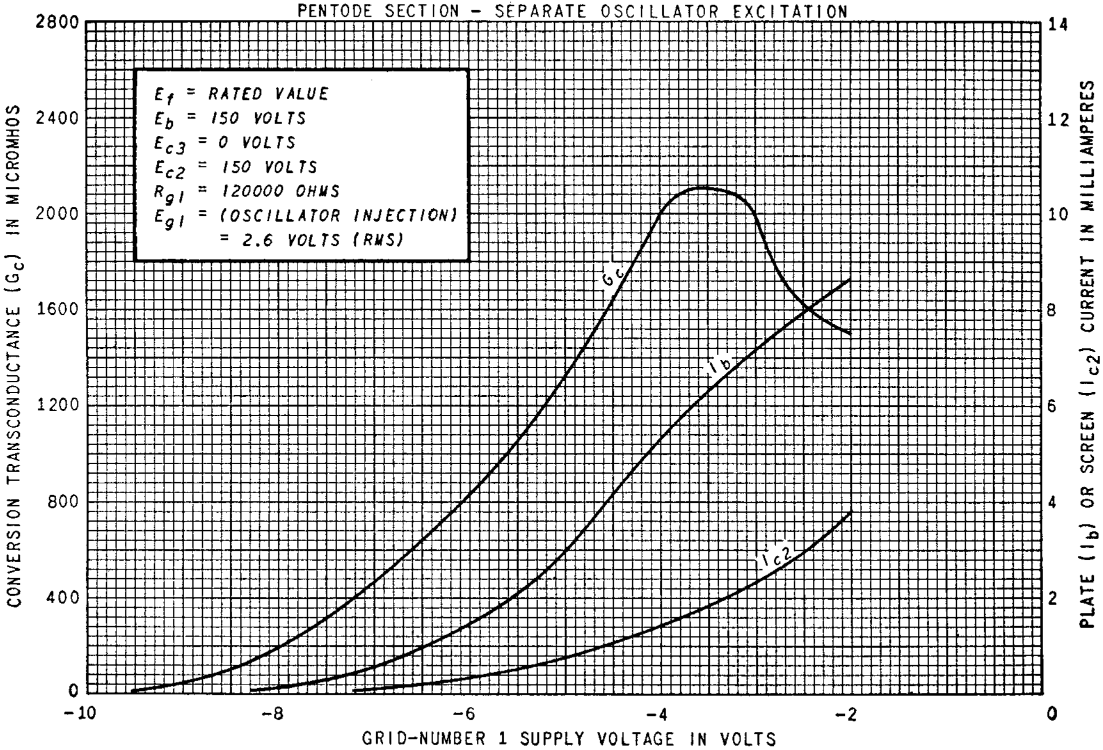
SCREEN RATING CHART

PENTODE SECTION



OPERATION CHARACTERISTICS

PENTODE SECTION - SEPARATE OSCILLATOR EXCITATION



OPERATION CHARACTERISTICS

PENTODE SECTION - SEPARATE OSCILLATOR EXCITATION

